VZCZCXYZ0004
PP RUEHWEB

DE RUEHC #9138 2842016
ZNY CCCCC ZZH
P R 102011Z OCT 08
FM SECSTATE WASHDC
TO RUEHBY/AMEMBASSY CANBERRA PRIORITY 0000
RUEHLO/AMEMBASSY LONDON PRIORITY 0000
RUEHFR/AMEMBASSY PARIS PRIORITY 0000
INFO MISSILE TECHNOLOGY CONTROL REGIME COLLECTIVE

C O N F I D E N T I A L STATE 109138

SIPDIS
PARIS FOR EST: HELEN SMITH
LONDON FOR CHRIS PALMER
CANBERRA FOR CAROL HANLON

E.O. 12958: DECL: 10/10/2033
TAGS: MTCRE ETTC KSCA MNUC PARM TSPA FR UK AS
SUBJECT: MISSILE TECHNOLOGY CONTROL REGIME (MTCR): "RISK (UNCONTROLLED) TECHNOLOGIES USEFUL TO BALLISTIC MISSILE PROGRAMS"

Classified By: ISN/MTR DIRECTOR PAM DURHAM FOR REASONS 1.4 (B), (D), (H).

¶1. (U) This is an action request. Please see paragraph 2.

¶2. (C) ACTION REQUEST: Department requests Embassy Paris provide the interagency cleared paper "Risk (Uncontrolled) Technologies Useful to Ballistic Missile Programs" in paragraph 3 below to the French Missile Technology Control Regime (MTCR) Point of Contact (POC) for distribution to all Partners. Department also requests Embassy London provide paper to the MTCR Information Exchange (IE) Co-Chair (John Andrews), and Embassy Canberra provide paper to the Australian MTCR Plenary Chair for 2008/2009 and/or appropriate staff. Info addressees also may provide to host government officials as appropriate. In delivering paper, posts should indicate that the U.S. is sharing this paper as part of our preparation for the Information Exchange that will be held in conjunction with the MTCR Plenary in Canberra (November 3-7). NOTE: Additional IE papers will be provided via septels. END NOTE.

¶3. BEGIN TEXT OF PAPER:

CONFIDENTIAL//REL MTCR

Risk (Uncontrolled) Technologies Useful to Ballistic Missile Programs

Changes to technologies for the development and manufacture of missiles require us to think about how they may impact Missile Technology Control Regime (MTCR) controls. Some of these changes have been subtle, relying on improvements or innovations to materials or methods of manufacture, while others have been more dramatic. As technological advances occur, and advanced materials and products become more commercially available, MTCR Partners need to take steps to ensure that the Regime keeps pace with new technologies and changes in proliferant procurement.

Fiber Placement Machines

Fiber placement machines are becoming more widely used for the manufacture of large-scale, complex composite structures. These structures which utilize a fiber and resin matrix, or prepreg material, offer lighter weight with equivalent or greater strength than metals. It is clear that

while fiber placement machines can and do perform the same tasks as a filament winding machine, they are technically not filament winding machines.

Fiber placement machines do not use the same technology as filament winding machines. Fiber placement machines are similar to filament winding machines, but they do not rely on a rotating mandrel for fiber placement. Individual tows (groups of multiple fibers) are fed through a heating section and tensioning system to the placement head, which is controlled by computer numerical control (CNC). Depending on the number of axes (degrees of freedom), the placement head is indexed along the material placement path, while feed motors dispense the individual heated tows into position. A pressure roller also follows the placement path, thereby compacting the fibers into place. Both fiber placement machines and filament winding machines can be used to produce missile components such as rocket motor cases and propellant tanks.

Item 6.B.1.a of the MTCR Annex currently controls filament winding machines that meet specified parameters. Due to the different name and technical differences in how the equipment operates, an exporter could argue that 6.B.1.a does not apply to fiber placement machines. The U.S. recently evaluated this control and discovered a potential loophole in the control text.

Composite Fiber

Item 6.C.1. of the MTCR Annex currently controls resin impregnated fiber (prepreg material) that meets certain criteria for tensile strength and modulus.

While prepreg materials are commonly used in the fabrication of components for ballistic missile systems, they are not exclusively used. In cases where a dry fiber is used along with a resin bath at application the MTCR Annex would not control the dry fiber, regardless of strength or modulus. Dry fiber can be processed locally to manufacture prepreg materials prior to use, or the fiber can be used in a wet-wound process as described above. Carbon, glass, and aramid fibers that could have a missile application are controlled by either the Nuclear Suppliers Group and/or the Wassenaar. In view of their missile applications, Partners should give consideration to whether controls on composite fibers would prevent proliferators from utilizing a potential loophole in the current regime. Additionally, when conducting their risk assessments on licenses for export of dry fiber, Partners should use catch-all controls or other existing national authorities to prevent exports of concern.

Pyrotechnically Controlled Valves

Pyrotechnic valves are single-use, high-reliability valves that are used to positively initiate or terminate the flow in liquid and gas systems. These valves are a well-known and well-used technology throughout the world and are predominantly used in the military aerospace industry. Virtually all liquid-propellant and some solid-propellant ballistic missile systems use pyrotechnic valves to initiate or terminate the flow of propellants and/or pressurant gases. Further, only a few manufacturers of these types of valves exist in the world, as they require precision manufacture and tight control of material properties in order to achieve the high reliability. Export control of pyrotechnic valves usable in Item 1 or Item 19 missiles could therefore hamper or slow production of ballistic missile systems in the developing world.

Other military uses include air-to-air, air-to-ground,

and surface-to-air missiles as well as some use on military aircraft. Commercial or industrial uses of pyrotechnic valves may include fire suppression systems or some safety systems in the chemical industries. Commercial and industrial valves are not aerospace rated and tend to have much higher inlet diameter to weight ratios, operate in lower acceleration and vibration environments, and/or possess significantly lower pressure ratings.

Optical Fiber Winding Equipment Intended for the Production of Fiber Optic Gyroscopes

The last two decades have seen the transition of Fiber Optic Gyroscope (FOG) technology progress from laboratory-grade engineering models into mainstream commercial, military, and aerospace applications. FOGs have many advantages over spinning mechanical gyroscopes: they are solid-state (no moving parts), have low power consumption, provide data at moment of turn-on, do not require heaters, have high angular rate capability suitable for strapdown applications, and are relatively insensitive to acceleration-induced errors. FOGs also offer advantages over competing optical sensor technologies such as Ring Laser Gyros (RLGs). The precision machining, polishing, high-technology clean rooms, laser gas filling/sealing operations, and mirror manufacture required for RLG fabrication comes at a price of substantial capital equipment costs. By comparison, FOGs are typically assembled in a standard laboratory environment with tools and equipment commonly used in the telecommunications industry for processing optical fiber and electro-optical assemblies.

Item 9.B of the MTCR Annex currently regulates test and production equipment related to mechanical gyroscopes and RLGs but nothing specific to FOGs. The inherent dual-use nature of most FOG fabrication equipment has made the prospect of export control of this technology a daunting task.

The export control of optical fiber winding machines, specially designed for the production of FOGs, is an area for consideration by the Partners. These specialized machines are one of the few tools used in the manufacture of FOGs that are not commonly found in telecommunications applications. One of the major components of every interferometric fiber optic gyroscope is a spool that is wound with hundreds- to thousands of meters of optical fiber. The process of winding a navigation-grade FOG spool is very complex and requires that the optical fiber be laid out in specific deterministic patterns with exacting control of parameters such as fiber tension, layer sequence and count, geometry, and cross-over techniques. These process complications are required in order to reduce gyro performance errors that occur when small stresses are formed within the fiber coil. One effective design used by FOG manufacturers is commonly known as the "quadrupole" pattern of fiber laying but various other proprietary patterns are also possible. Optical fiber winding equipment suitable for FOG production is highly specialized and only used for this singular purpose. Proper control of optical fiber winding machines could help limit the proliferation of this emergent technology for use in WMD-capable missile systems.

¶4. (U) Please slug any reporting on this or other MTCR issues for ISN/MTR. A word version of this document will be posted at www.state.sgov.gov/demarche.
RICE